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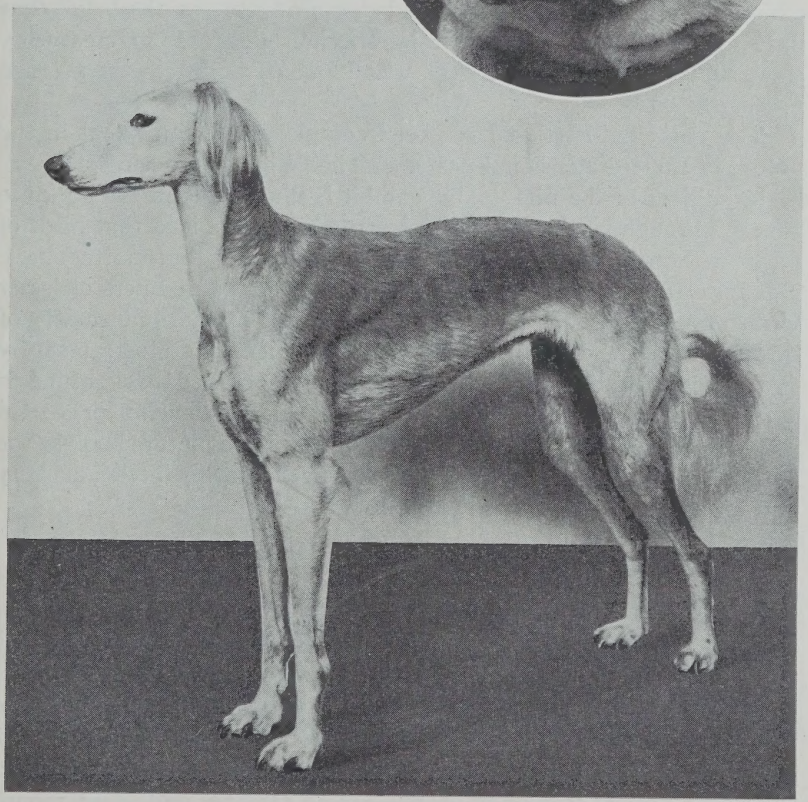
ROYAL ONTARIO MUSEUM OF ZOOLOGY

BULLETIN No. 7

TORONTO, JANUARY, 1938.

AN INTERNATIONAL CHAMPION BULLDOG "BUNJIE", DONATED TO THE MUSEUM BY R. P. SPARKES, ESQ.

These two specimens were mounted under the Reuben Wells Leonard bequest.



A RARE BREED OF DOG, THE SALUKI, DONATED BY MRS. ADELE MULOCK. THE SALUKI IS ONE OF THE OLDEST BREEDS OF DOGS KNOWN, IMAGES OF IT BEING FOUND IN EARLY EGYPTIAN REMAINS.

SOME NEW EXHIBITS

The Breeds of Dogs

A series of mounts of outstanding specimens of various breeds of dogs has been inaugurated. It is not planned to have representatives of all breeds; by selecting widely different types the effect of artificial selection in producing markedly different animals will be strikingly shown.

Two of the first three breeds to be mounted are illustrated herewith. The third, a Canadian champion beagle hound, Vermont Park Leader, was donated by Mr. Emerson Robertson.

Biological Principles

A new series of exhibits is in process of construction. These will deal with a variety of subjects, including biological principles, economics and history. The treatment being used rests on the belief that pleasing colour and composition is especially desirable in presenting these subjects, which might otherwise be unattractive to the average Museum visitor.

The two exhibits that have been completed are somewhat in the nature of three-dimensional posters. The "Role of the Bird of Prey" is the subject of the first. This exhibit is illustrated on the opposite page. Through it, the visitor is presented with the idea that birds of prey (or the whole predatory element of nature, for that matter) have a definite function, by aiding in the control of the numbers of lesser forms on which they feed. Although there are many ramifications of this principle, the exhibit merely presents the idea and illustrates it by two simple instances of local occurrence. A curved background is harmoniously tinted in two tones. A concluding thought, presented particularly for juvenile observers, by a replica of a picture book at the base of the panel, makes the owl and mouse relationship into an allegory of the well-known story of the Pied Piper.

THE REUBEN WELLS LEONARD BEQUEST

Reference was made in Bulletin 6 to the collection of large mammals that had been added to the gallery exhibits as a result of the Reuben Wells Leonard bequest. Additional mounts to be credited to this source are as follows: Buffalo calf, elk fawn, coyote, brush wolf, black timber wolf, white timber wolf, wallaby, Tasmanian devil, mink, two prong-horned antelopes, barren ground caribou, mule deer, mountain caribou, Columbia black-tail deer, saluki hound, English bull dog and beagle hound.

THE ROLE OF THE BIRD OF PREY
THE STARLING FIRST INVADED ONTARIO IN 1918. ITS INCREASE IN ONE DECADE RENDERED IT AN ECONOMIC THREAT. IN 1932 TWENTY COOPER'S HAWKS WERE COLLECTED AND EXAMINATION DISCLOSED THAT 3 OUT OF 4 HAD FED ON STARLINGS. THUS, HAWKS AID IN REMOVING A POPULATION SURPLUS.
IN THE WINTER OF 1935-36 MEADOW MICE WERE VERY NUMEROUS IN THE TORONTO REGION. IN ONE SECTION THEY CAUSED CONSIDERABLE DAMAGE TO SHRUBS AND YOUNG TREES. SHORT-EARED OWLS CONVERGED ON THE AREA AND REMAINED TO FEED ON THE MICE. THUS OWLS ARE AN EFFECTIVE AID IN REMOVING A SURPLUS OF RODENTS.
MEADOW MICE 72%
THE PIED PIPER AND THE RATS
AN ALLEGORY - OWL AND MICE

A NEW TYPE OF EXHIBIT, WHICH MAY BE DESCRIBED AS A THREE-DIMENSIONAL POSTER.

MUSEUM AIMS AND FUNCTIONS

The aims and functions of museums have been admirably summarized by a committee of the British Association for the Advancement of Science as follows:

1. Collection of works of Nature and of man. Collecting may be through work in the field, through purchase, and through donations. The first of these is the most valuable as assuring accurate data of provenance. Obviously, the function of collecting must precede all others.

2. Preservation of material thus collected. Much of this is the irreplaceable groundwork of human knowledge, and ought to be safeguarded at all costs. This is the necessary second function.

3. Study of the collected objects. This is the research side of museum work, and, whether carried out by the staff (as in large measure it should and must be) or by specialists under the direction of the staff, it must be prosecuted if museums are to fulfil their highest function, which is the advancement of Science, Art and Industry.

4. Classification of museum material, so that each specimen is readily accessible to future students.

5. Publication of the results achieved and of guides to the contents of the museum.

(*a*) By printed memoirs, catalogues, summary lists, and guide books.

(*b*) By the exhibition of specially selected series of specimens in an arrangement designed to bring out some definite information, and provided with labels written for the same end.

(*c*) By the loan of material to other museums, exhibition galleries, schools and similar institutions.

(*d*) By lectures in or outside the museum, in the galleries or in a lecture room, on the ordinary exhibited series, or on specimens selected *ad hoc*.

ACCESSIONS

The extent and origin of the additions to the collections of the Museum of Zoology are indicated by the following table of accessions for the year October 1, 1936, to September 30, 1937.

	Donated	Collected	Purchased	Exchanged	Total
Mammals	334	427	255	86	1,102
Birds	698	1,187	482	5	2,372
Birds' eggs (sets)	446	31			477
Birds' nests	92	37			129
Reptiles	95	33			128
Amphibians	96	91		1	188
Fish*	546	645	70	5	1,266
Insects	1,392				1,392
Spiders	71	4,000			4,071
Molluscs*	822	93	1,644	49	2,608
Other invertebrates*	259	25	44		328

*When a number of small fish, molluscs and other invertebrates are taken in the same place and at the same time, they are usually catalogued and stored together. The total number of specimens in these divisions are therefore much in excess of the number indicated above.

Accessions to the library included 106 books and 2,311 unbound publications.

It is impossible here to mention all the donors from whom specimens have been received. The following are among the more outstanding donations:

AUSTRALIAN MUSEUM (through Miss H. Bain). Collection of 40 species of Australian marine shells.

BOGGS, O. D. Collection of South American birds, all with complete data.

BOWEN, H. M. Skin of cinnamon bear from Rainy River District, Ontario.

BROOKS, Major Allan. 15 skins of Pacific Coast birds.

CHANT, Dr. C. A. 277 mollusc shells from Australia, together with 1 shell saved from the University fire of 1890.

COVENTRY, Professor A. F. 50 mammals, 16 fish, 3 birds' nests, and 2 snakes.

DEEKS, D. B. and T. M. SHORTT. Four thousand feet of motion picture film from Alaskan Expedition.

FERGUSON, R. G. 26 birds from James Bay.

HAHN, Paul. 2 passenger pigeons, making 49 in all donated by him.

HOPE, C. E. 916 insects.

KERR, Charles J. 18 journals of his father and brother, John W. Kerr and Fred Kerr, Fisheries Inspectors of Hamilton, 1864-1898; 39 early reports of the Fisheries Department at Ottawa; 14 other government reports and 5 books.

LUNN, W. H. 45 birds.

MARSH, Rev. Donald B. Skin, skull and antlers of a barren ground caribou, 2 mammals, 10 birds, 11 fish, 119 insects, 9 lots invertebrates.

MORROW, G. A. (through J. R. Barr, Farm Manager). 26 foreign birds from their aviary. Some of these are rare in collections, and difficult to obtain except through such sources.

MCINTYRE, Harold V. Collection of 290 sets of eggs, 63 nests.

NATIONAL PARKS BUREAU, Ottawa. Grizzly bear, trumpeter swan and mountain lion.

PROCTOR, Mrs. Carol. Passenger pigeon.

RONAYNE, J. Columbia black-tail deer.

SAUNDERS, Dr. W. E. 158 birds killed at the Long Point lighthouse.

TONER, G. C. 18 mammals, 44 fish, 4 birds, 29 amphibans and reptiles.

TORONTO PARKS DEPARTMENT. 15 mammals, 23 birds and 9 reptiles, including Parry's wallaby, Grevy's zebra, antelope, Tasmanian devil, fruit bat, peacock, flamingo, brown pelican, and little flamingo.

WHELAN, R. V. A large collection of miscellaneous specimens including molluscs, crustaceans, spiders, fish, birds and mammals.

WHITE, Mrs. David, and family. A valuable collection of scientific publications, the property of Adam White, F.L.S., a member of the staff of the Zoological Department of the British Museum from 1835 to 1863.

WHITE, H. C. 19 mammals, 6 birds, 177 fish.

SUMMER FIELD WORK

The Museum had a most successful summer of field work. Through these field expeditions the Museum is gradually filling up the blanks in our knowledge of the animal life of our province.

An interesting phase of this work is the light it is throwing on the return of life to our province, following the retreat of the last ice sheet. It is evident, for instance, that one avenue by which animal life returned to Ontario was across the St. Lawrence into eastern Ontario. Our work has revealed a number of forms of life that are found in Ontario only in the extreme eastern part of the province. Others are found there and in the south-west but not in the intervening area. For instance, the pilot black snake (*Elaphe obsoleta*) is known to occur in Leeds County in eastern Ontario and in south-western Ontario as far east as St. Catharines, but not in the area between these points. Other species found in eastern Ontario and in the south-western part of the province but not between are the blue-tailed skink, map turtle, musk turtle and Blanding's turtle. Species that have penetrated into eastern Ontario but have not spread westward include the fallfish (*Leucosomus corporalis*) and cutlips (*Exoglossum maxillingua*) and a number of species of spiders discovered by Mr. Kurata of the Museum staff during the past summer. Undoubtedly additional studies in this area will add to this list.

Great interest was attracted by the American Museum of Natural History's expedition to Shiva Temple, an erosion-made "island" in the Grand Canyon of Colorado. The purpose of the expedition was "to study the animal species which, isolated from the mainland for several thousand years, have been untouched by the evolutionary changes going on in the surrounding country." Opportunities of studying similar evolutionary changes are afforded by the animals of eastern Ontario as compared with those of south-western Ontario. Species which occur in these two areas and not between have probably been separated from one another as long as the animals of Shiva's temple have been isolated from the same species on the mainland. In several

respects, Ontario affords an excellent field for the study of problems of zoogeography.

Mammals

Three field work projects were carried out during the summer. Messrs. Cross, Prince and Downing investigated conditions in early spring along the St. Lawrence valley from Kingston to the Ottawa river. An abnormal scarcity of small mammals was found in the area although evidence was available to show that they had been present in some abundance the previous fall.

Messrs. Prince and Downing spent eight weeks in field work along the transcontinental line of the Canadian Pacific Railway between the French River and Chapleau. Collections were made at Chapleau, Biscotasing and Bigwood, completing the survey begun last year of the area between the French River and Rossport on the north shore of Lake Superior.

In addition to this work by members of the staff, collections were made at various points by amateur collectors.

Birds

Prior to 1923, our knowledge of Ontario's bird life was based on casual reports of individual workers, whose field of activity was largely confined to the more populous centres in the south. In 1923, the Royal Ontario Museum of Zoology undertook to carry out a survey of the Province. Except for the necessary adjustment of each summer's work to available funds, this survey has been proceeded with as a systematic programme, although an interruption was enforced during the difficult years of 1931 to 1935.

The objective of such a survey is, first, to determine in some detail the kinds and distribution of birds occupying the provincial area during the reproductive season. Secondly, work in the field provides specimen material for comparative studies which will contribute towards an understanding of racial variation of birds in this part of North America. Other data bearing on the ecology and behaviour of birds and on the physiography and other environmental factors of each district visited, although obtained more or less incidentally, are an important product of these surveys.

The work conducted in the field during the summer of 1937 was directed towards tying together the information obtained in surveys during previous years at key stations—Rainy River, Nipigon, the north-east shore of Lake Superior and Sault Ste. Marie. Mr. L. L. Snyder, Curator of the Division, and T. M. Shortt investigated the region along the Canadian Pacific Railway from the Manitoba boundary to Fort William, establishing four collecting stations along this

line: at Ingolf, Wabigoon, Savanne and Murillo. Mr. J. L. Baillie and C. E. Hope worked along the same railroad through Sudbury District, establishing stations at Chapleau, Biscotasing and Bigwood. Eleven hundred and fifty specimens were collected, all but a very few preerved in the field, ready for incorporation into the Museum's study collection. At least one new species was added to the Provincial list by this summer's work. One hundred and forty-three species of birds were recorded by the combined parties and a provisional estimate of relative abundance arrived at.

Amphibians and Reptiles

No special programme of field work was undertaken by this Division during the past summer. Two short field excurions were made by Mr. Logier, one to Turkey Point and Long Point, Lake Erie, and one to the Meaford district. These field trips were undertaken to secure specimens and information on some species about which comparatively little has been known, so far as Ontario is concerned, viz., the four-toed salamander and the ring-necked snake.

Fishes

On account of the importance of eastern Ontario in the study of animal distribution, special attention was devoted to that area by the Division of Fishes during the past summer. Miss I. Limbert, assisted by Mr. G. C. Toner of Gananoque, made a collecting trip from the St. Lawrence to the Ottawa rivers. At Ottawa, they were met by J. R. Dymond, and ten days were spent in that area. One purpose of this expedition was to secure information in connection with the preparation of an account of the fishes of the Ottawa region, which is to be published for the meeting of the American Association for the Advancement of Science in Ottawa next summer. The expedition was quite successful, all the species expected were found and also some which were a surprise.

Through the co-operation of the Hudson's Bay Company and a number of interested individuals, the Museum is gradually building up a collection of the fishes of the North West Territories. Although this was one of the first parts of the country whose fish life was investigated, there has been comparatively little scientific information added to our knowledge of this area since Richardson published his account of the fishes in the Fauna Boreali-Americana in 1836.

Molluscs

Although the Museum has long possessed a considerable collection of molluscs, it is only within the last two or three years that it has been possible to organize the care and study of this material on the basis of a regular division. Although the collection contains a good deal of

material from outside Ontario, special attention is being given to a study of the molluscs of Ontario.

During the past summer, attention was directed to the land shells. Large collections of shells, concentrated by spring floods, were secured by a few days' work at eleven different localities. One such collection has been partially sorted and classified. It yielded over 4,000 specimens, representing more than 40 species. This provides at small expense large series of specimens, suitable for distributional and taxonomic studies, and in additon a surplus for exchange with other museums. Such suites of shells would require perhaps five or six months for collection by ordinary methods.

In addition to collecting designed to build up the collections of Ontario molluscs, a special study of the fauna of small islands was undertaken by Mr. J. G. Oughton. Islands are of interest to the ecologist, since they may be considered as colonies somewhat isolated in space. Such an investigation is expected to contribute materially to the general study of zoological distribution in which the Museum is especially interested.

Spiders

The Museum has an extensive collection of the spiders of Ontario. Much of this collection is a by-product from expeditions sent out for other purposes, but large numbers have been collected by interested friends of the Museum. During the past summer, additions were made from areas hitherto unrepresented: Timagami, New Liskeard, Pembroke and Eastern Ontario.

GROWING SCARCITY OF MOOSE

Concern over the decrease of the moose in Ontario is voiced by correspondents of the Museum. Of 97 giving information on the status of the moose in the province, 49 stated that it was growing scarcer and many expressed concern for its continued existence, unless further protection is given it.

RED SQUIRREL AS A FUR BEARER

During the winter of 1936-37, large numbers of red squirrels were trapped for their fur in many parts of northern Canada.

A MEADOW MOUSE PLAGUE

Early in the autumn, reports of a plague of meadow mice reached the Museum from Kapuskasing and Smoky Falls. According to these reports, meadow mice were excessively abundant over an area at least

eighty miles in length, centering around Kapuskasing. The Museum immediately sent out a questionnaire to correspondents in northwestern Ontario in an effort to determine how large an area was affected, and to get as much additional information on the outbreak as possible. From the replies received, it would seem that this outbreak was rather circumscribed. Reports from the Manitoba-Ontario boundary and from the Ontario shore of Hudson Bay indicate abundance in these areas also.

It will be remembered that, during the fall of 1935 and the winter of 1935-36, these mice were very numerous in certain sections of southern Ontario. Reports from New York and Illinois indicate that they were also abundant in 1935 in those states.

UNUSUAL ABUNDANCE OF SPHINX OR "HUMMING BIRD" MOTHS

The Museum has been deluged with requests to identify sphinx moths, which have been unusually abundant in many parts of Ontario during the past summer. These large insects visit flowers for the purpose of feeding on the nectar, much as humming birds do. The sphinx moth which was so numerous in Ontario during the past summer was *Celerio lineata*, a species rarely found even in southern parts of the province. The matter is still under investigation, but it seems likely that these moths came into the province as adults, probably from states immediately to the southwest of Ontario. They appear to have reached every part of the province, including Moose Factory on James Bay.

That the abundance of these moths is of more than local interest and importance is indicated by the fact that, at the recent meeting of the British Association for the Advancement of Science, a paper on cycles of abundance and scarcity of hawk moths was presented. Records extending over 130 years in Britain and 60 years in America were said to demonstrate the existence of such cycles.

DO SNAKES SWALLOW THEIR YOUNG TO PROTECT THEM?

A controversy on this subject arose last year when the following note was published in a number of newspapers across Canada:

"Lecturing on Unnatural History, Prof. J. R. Dymond said that among the stories he would like substantiated are: 'That the mother snake protects its young by swallowing them. . . .'."

The actual statement made during the lecture was: "I do not know for certain whether snakes swallow their young or not. I have never

seen it happen but I believe in the existence of plenty of things I have not witnessed with my own eyes, but I do not believe that the habit of swallowing their young is a regular habit of any of our snakes. If anyone has the kind of evidence to the contrary that would be accepted in a court of law, I am willing to listen to him".

In answer to this challenge, quite a number of persons submitted evidence as to the swallowing of young by old snakes. As the letters to the Museum and in the newspapers accumulated, it became evident that most of the occurrences described happened many years ago. Many of the letters did not state when the events occurred, but twenty-four gave some indication as to time: two said it was 50 or more years ago, four that it was 40 or more years ago, four that it was 30 or more years ago, six that it was "years ago", six that it was "when I was a child", one observer had seen the event in 1935 and one in 1936.

What conclusion can one draw from this evidence? It suggests:

(1) That snakes once had the habit of swallowing their young that but the practice is dying out.

Or (2) that the passage of time is usually a necessary element in the development of such a mental picture.

What do those who have made a special study of snakes say about this belief? Raymond L. Ditmars, Curator of Reptiles in the New York Zoological Park, in his book, "Snakes of the World", says:

"During thirty years of observation of serpents under all sorts of conditions in which they are found, I have watched them in areas in the temperate zones, on the deserts and in the tropics, and have carried the story (of snakes swallowing their young) in mind. To these observations are added the studies of captive specimens. Thus the author has had every opportunity to verify the occurrence. I have never noted any hint of it. . . .

"Over the period of years I have mentioned, I have never seen a wild serpent or a captive one make any attempt to swallow its young. I have never seen a wild serpent make any attempt of any kind to protect its young—and adults with young nearby have been noted under numerous conditions. . . . . It has always been a case of all members of the group seeking individual shelter—and this is the most practical thing to do. . . . .

"The adult snake being the most wary is the first to glide to shelter and disappears like a flash under a rock. The young hesitate. They are not so quick in getting a start, but they have instinctive fear of the human. They scatter in all directions. Those near a crevice glide quickly in. Others, taking no chance in losing the split-second's time in turning in a direction other than the head is pointing, glide straight ahead, threading into the longer grass and out of sight. It is a simultaneous disappearance. There is no lost time—no lost motion. Such

a manifestation can be completed so quickly that an experienced collector may not have a chance to capture a single member of the group.

"From what I know about men and snakes, such a reptilian family exodus is thus conducted in the safest way for the snakes. If the mother should indulge in any spectacular action in pausing to hiss, open her mouth and await a parade of snakelets to make their way down her throat, the whole family might be wiped out through the human finding opportunity to seize a stick and kill her, as is the average human way; and the snake is well aware of its danger in the presence of man."

Dr. K. P. Schmidt, assistant curator of Reptiles and Amphibians in the Field Museum of Natural History, Chicago, says, in closing a discussion of the alleged habit of snakes swallowing their young:

"Snake stories of this type are true myths, all the more interesting because they are alive and growing, and herpetologists may resign the study of this field to their anthropological brethren with the hope that it may produce valuable insights into the nature of mythology and folk-lore."

PERIODIC ABUNDANCE AND SCARCITY OF VARYING HARES

Cycles of abundance and scarcity in the numbers of varying hares (snow-shoe rabbits) recur with surprising regularity in the north woods of Canada. It has been popularly believed that the hares die off every seven years, but careful studies have recently shown that the cycles are nearer ten years in length on the average. The years in which hares were last abundant in the Hudson Bay watershed before the successive periods of decrease were as follows: 1856, 1864, 1875, 1886, 1895, 1905, 1914, 1924 and 1934 or 8 cycles in 78 years.

These are some of the conclusions of Dr. D. A. MacLulich, whose four-year study of hare periodicity has recently been published. The study was carried out under the joint auspices of the Department of Biology, University of Toronto, and Royal Ontario Museum of Zoology. This study concerned only the varying hare (*Lepus americanus*) which is also called snow-shoe rabbit. This is the common hare of Ontario from Muskoka northward and of the north woods of Canada generally. It turns white in winter, unlike the cottontail rabbit of southern Ontario and the Ottawa valley and the introduced European hare (wrongly called jack rabbit) which remain the same colour the year round.

Hare populations were found to vary from about one per square mile at times of extreme scarcity to over one thousand on the same area at times of abundance. The highest number met with was in the

north part of Frontenac county in July, 1932, when there were thirty-four hundred per square mile.

Hares do not reach their peak of abundance or begin to die off in the same year in all parts of Ontario. During the recent cycle the last year of great abundance varied as follows:—1932, in a small district centering on the north part of Frontenac county; 1933, from Bruce peninsula and southern Algoma to Renfrew county; 1934, in the height of land country from Temiskaming district past lake Nipigon to include Kenora district; 1935, on the northern part of the clay belt; 1934, on the coast of James bay; and 1933, in the southern part of Patricia region. For Canada as a whole the cycle appeared to reach a peak earliest in the coastal districts of the maritimes and the St. Lawrence valley, the delta of the Mackenzie river, and British Columbia; and latest in the coniferous forest belt across the interior.

Efforts were made to determine the cause of the wholesale dying off which periodically affects the hares. Various parasites were found, including tapeworms, stomach worms, mites, ticks and fleas. Adult tapeworms in the intestine were scarce, but young stages which look like small bladders with a white spot in each, were found in 40 per cent of the hares examined. From the condition of the infested animals, however, it appears that these do no great harm. Large watery cysts containing many white granules which are the heads of another species of tapeworm, *Multiceps serialis*, occurred rarely. These cysts or bladders grow between the muscles and can interfere with the use of limbs or other organs. These worms grow to adult form in the intestines of dogs, wolves, foxes or other animals so unfortunate as to eat infected rabbits.

Numbers of the blood-sucking stomach worms, *Obeliscoides cuniculi*, were found in the stomachs of nearly all the hares examined. At Smoky Falls on the Mattagami River in the summer of 1935 stomach worms caused an epidemic, the only one observed during the present study. In spite of proper care, numbers of recently captured hares died in convulsions and no other possible cause of death could be found.

Rabbit ticks were by far the most numerous of the external parasites. They were found in all hares in summer, sometimes in numbers as high as three thousand ticks per hare.

There was no evidence that any bacterial disease was responsible for the recent decrease in hare numbers. A disease known as tularemia or rabbit fever, which is known to infect human beings, was found among hares in widely separated parts of Ontario but not in any large percentage of the population.

The periodic decrease in hare population is due to a wholesale dying off, but the epidemic that causes it is not always the same disease at every time and place. The course of a cycle is as follows:—The

hares increase according to their natural powers of reproduction until they approach a condition of abundance when their increase slows down and their numbers tend to remain at this more or less high level of population. This density of population never endures for long, however, as crowding and the conditions of the animals' sanitation and feeding inevitably favour the spread of some disease or parasite. For instance, when a thousand or more hares live on a square mile the chance of spreading stomach worms is much greater than when only one or two occur on the same area. The eggs of these worms are voided by the hares with their droppings, the tiny larvae which hatch from these eggs adhere to plants and infect hares which eat them. The denser the population, the greater the chance for infection with parasites or disease. It is under crowded conditions that one disease or another makes its appearance in epidemic form.

No support was found for the belief that hare cycles are caused by cycles in the numbers of sun spots. Statistics of sun spot numbers and hare populations for the past seventy-five years show that sometimes the maximum numbers of sun spots occur when hares are at their peak of numbers and at other times when their populations are at the lowest point. Between 1856 and 1933 there have been eight hare cycles but only seven sun spot cycles.

MUSEUM PUBLICATIONS

Following is a list of publications in various series issued by the Museum. These publications, except for the Bulletins, cannot be supplied free except to institutions with which exchange arrangements have been made. To others the price has been made as low as possible, in order to permit anyone interested to obtain copies. The Museum has no special publication fund and depends for the issuing of additional publications, in part at least, on receipts from the sales of those previously issued. The low price at which many of these are sold is made possible by the fact that they were originally published elsewhere, for example, in the Transactions of the Royal Canadian Institute, the University of Toronto Studies and the Report of Commissioner of Fisheries of British Columbia. The publication of Contributions 7 and 10 were made possible by a grant from the Reuben Wells Leonard bequest and Contribution 2 by a donation of Wm. Robertson, Esq.

CONTRIBUTIONS

This series contains reports of Museum studies, including faunal surveys. Except where otherwise stated the price is twenty-five cents a copy.

1. A Faunal Survey of the Lake Nipigon Region, Ontario. By J. R. Dymond, L. L. Snyder and E. B. S. Logier. 58 pages.

2. A Faunal Survey of the Lake Abitibi Region, Ontario. By the staff of the Royal Ontario Museum of Zoology. 46 pages.
3. A Faunal Investigation of King Township, York County, Ontario. By L. L. Snyder and E. B. S. Logier. 42 pages (out of print).
4. A Faunal Investigation of Long Point and Vicinity, Norfolk County, Ontario. By L. L. Snyder and E. B. S. Logier. 120 pages (out of print).
5. Some Account of the Amphibians and Reptiles of British Columbia, by E. B. S. Logier. 26 pages. (out of print).
6. A Study of the Sharp-tailed Grouse, by L. L. Snyder. 66 pages.
7. The Passenger Pigeon in Ontario. by Margaret H. Mitchell. Records of the history of the now extinct wild pigeon (*Ectopistes migratorius*) in Ontario. Paper, $1.00. Cloth, $1.50.
8. The Distribution of Breeding Birds in Ontario, by James L. Baillie, Jr., and Paul Harrington. 134 pages.
9. Some Freshwater Fishes of British Columbia, by J. R. Dymond. 14 pages.
10. The Birds of the Lake St. Martin Region, Manitoba, by T. M. Shortt and Sam Waller. 51 pages.
11. Baird's Sparrow, by B. W. Cartwright, T. M. Shortt and R. D. Harris. 44 pages.

OCCASIONAL PAPERS

These are brief reports of scientific work not extensive enough for inclusion in the Contribution series. Price, 10 cents a copy.

1. A New Genus and Species of Flightless Duck from Campbell Island, by J. H. Fleming.
2. A Revision of the Sharp-tailed Grouse with a Description of a New Race, by L. L. Snyder.
3. A Summary of Data Relative to a Recent Invasion of Willow Ptarmigan, by L. L. Snyder and T. M. Shortt.

HANDBOOKS

As the name suggests, this series includes brief, popular accounts of the subjects dealt with. They are intended as guides to the study of the groups discussed. Each includes a number of illustrations.

(Unnumbered) Guide to the Game Fishes of Canada. (Out of print).

No. 1. The Mammals of Ontario, by E. C. Cross and J. R. Dymond.....25c
52 pages; lists and briefly describes the mammals of the Province, indicating how to distinguish closely related forms; includes a list of 82 books and other publications of value in the further study of this group.

No. 2. The Hawks and Owls of Ontario, by L. L. Snyder.....35c
48 pages; describes the hawks and owls occurring in Ontario, stressing the characters by which each may be identified when seen at a distance; illustrated by 30 pen and ink drawings. An important feature is the discussion of the food habits of the different species, based on the examination of several hundred stomachs of birds killed in Ontario. The biological role and place of the birds of prey in nature are discussed at length in the introduction.

No. 3. The Amphibians of Ontario, by E. B. S. Logier.....25c
16 pages; describes the 20 species of frogs, toads and salamanders of Ontario, indicating how they may be distinguished; illustrated by 20 pen and ink drawings.

LEAFLETS

The leaflets, with the exception of No. 2, are 4 pages. They are intended for use in schools but will be found of interest to anyone desiring a brief, popular account of the subject discussed. Single copies are sold at 5 cents or three for 10 cents; in lots of 25 or more they are 1 cent each.

1. Winter Birds. (out of print).
2. Twelve Canadian Birds. To accompany the second series of reproductions of bird paintings by Allan Brooks.
3. The Passenger Pigeon Habitat Group. (Out of print).
4. The Starling in Ontario.
5. Teaching Conservation.
6. The Eastern Speckled Trout.
7. Wild Life Conservation.
8. The Humane Treatment of Animals.
9. About Birds in Winter.
10. Bats.
11. Beginning Bird Study.

BULLETINS

The Bulletins contain reports of Museum work, accessions, gallery exhibits, surveys, studies and publications. They are distributed free only to Museum correspondents who regularly supply the Museum with information on wild life conditions in their areas. The price to others is 10 cents per copy. The present is Number 7 in this series.

BIRD PICTURES

Two sets of bird pictures have been distributed by the Museum but only the second set is now available—twelve coloured reproductions of bird paintings by the Canadian artist, Allan Brooks. These pictures, which are 9 by 11 inches in size, are beautifully reproduced and are suitable for framing for school or home. The birds represented are horned grebe, herring gull and common tern, great blue heron, mourning dove, osprey, downy woodpecker, nighthawk, kingbird, purple finch, barn swallow, redstart, house wren and winter wren. Price, 50 cents.

FIELD-CHECKING LISTS (5c a single copy, 3 for 10c, 1c each in lots of 25 or more).

BIRDS

A 4-page folder 3½ by 6 inches, containing a list of 305 birds that have been identified in the Toronto region; useful almost anywhere in Ontario for recording observations.

MAMMALS

Similar to above, listing 44 species of Ontario mammals; specially useful for recording trapping results.